

Hex Inverters

General Description

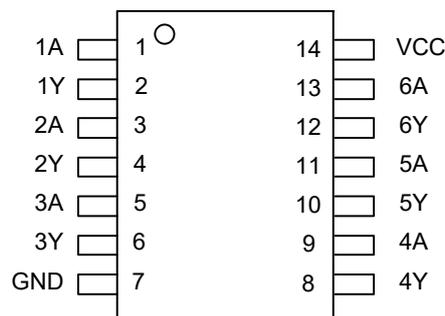
The ET74AHC04 contains six independent inverters operating from a 2V to 5.5V supply. They perform the Boolean function $Y = \bar{A}$ in positive logic.

Features

- Designed for 2V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- Outputs Can Drive up to 10 LSTTL Loads
- $\pm 8\text{mA}$ Balanced Output Sink and Source Capability
- Low Input Current of $1\mu\text{A}$ Max
- ESD Protection Complies with JESD22 Standard
 - HBM: $\pm 4000\text{V}$ Pass (JEDEC JS-001)
 - CDM: $\pm 1000\text{V}$ Pass (JEDEC JS-002)
- Latch-up Performance Exceeds $\pm 100\text{mA}$ per JEDEC JESD78F
- Part No. and Package Information

Product Name	Package	MSL
ET74AHC04M	SOP14 (3.9mm × 8.65mm)	3
ET74AHC04V	TSSOP14 (4.4mm × 5.0mm)	3
ET74AHC04P	DIP14 (6.35mm × 19.1mm)	3

Pin Configuration



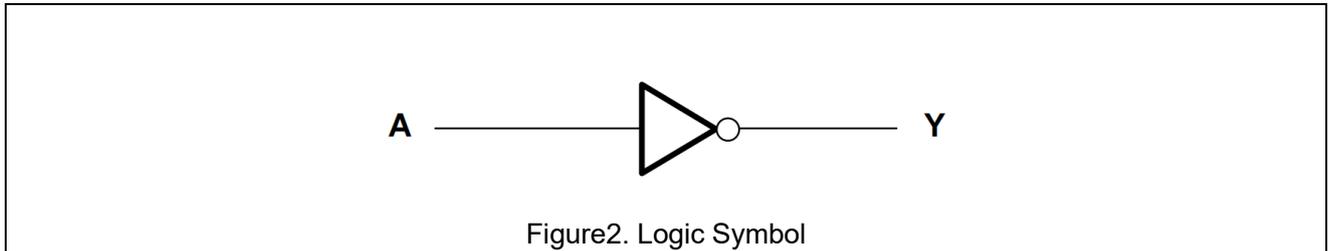
SOP14/TSSOP14/DIP14
Figure1. Pin Configuration

ET74AHC04

Pin Function

No.	Name	Function
1	1A	Channel 1 Input
2	1Y	Channel 1 Output
3	2A	Channel 2 Input
4	2Y	Channel 2 Output
5	3A	Channel 3 Input
6	3Y	Channel 3 Output
7	GND	Ground
8	4Y	Channel 4 Output
9	4A	Channel 4 Input
10	5Y	Channel 5 Output
11	5A	Channel 5 Input
12	6Y	Channel 6 Output
13	6A	Channel 6 Input
14	VCC	Positive Voltage Supply

Logic Diagram



Functional Description

Input	Output
A	Y
H	L
L	H

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Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V _{CC}	DC Supply Voltage (VCC Pin)		-0.5 to 7.0	V
V _I	DC Input Voltage ⁽¹⁾		-0.5 ≤ V _I ≤ 7.0	V
I _{IK}	DC Input Diode Current, V _I < GND		±20	mA
I _{OK}	DC Output Diode Current, V _O < GND, V _O > V _{CC}		±20	mA
I _O	DC Output Sink Current		±25	mA
I _{CC}	DC Supply Current per Supply Pin		50	mA
I _{GND}	DC Supply Current GND Pin		-50	mA
T _{STG}	Storage Temperature Range		-65 to 150	°C
V _{ESD}	ESD Classification	Human Body Model ⁽²⁾	±4000	V
		Charged Device Model ⁽³⁾	±1000	
I _{LU}	Max Latch Up Current Above V _{CC} and GND at 125°C ⁽⁴⁾		±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note1: I_O absolute maximum rating must be observed.

Note2: HBM tested per JEDEC JS-001;

Note3: CDM tested per JEDEC JS-002;

Note4: Latch up Current Maximum Rating tested per JEDEC JESD78F.

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
R _{θJA}	SOP14	Thermal Characteristics, Thermal Resistance, Junction-to-Air	80	°C/W
	TSSOP14		80	
	DIP14		86	

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V _{CC}	DC Supply Voltage (VCC Pin)	2	5.5	V
V _I	Input Voltage	0	V _{CC}	V
V _O	Output Voltage (High or Low State)	0	V _{CC}	V
T _A	Operating Temperature Range	-40	125	°C

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Electrical Characteristics

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		2.0	1.5			1.5		V
			3.0	2.1			2.1		
			5.5	3.85			3.85		
V _{IL}	Low-Level Input Voltage		2.0			0.5		0.5	V
			3.0			0.9		0.9	
			5.5			1.65		1.65	
V _{OH}	High-Level Output Voltage	I _{OH} = -50uA	2~5.5	V _{CC} - 0.1	V _{CC}		V _{CC} - 0.1		V
		I _{OH} = -4mA	3	2.58			2.4		
		I _{OH} = -8mA	4.5	3.54			3.7		
V _{OL}	Low-Level Output Voltage	I _{OL} = 50uA	2~5.5			0.1		0.1	V
		I _{OL} = 4mA	3			0.36		0.55	
		I _{OL} = 8mA	4.5			0.36		0.55	
I _I	Input Leakage Current	V _I = 5.5V or GND	0~5.5			0.1		2.0	uA
I _{CC}	Quiescent Supply Current	V _I = 5.5V or GND	5.5			1		40	uA

AC Electrical Characteristics

t_r = t_f = 3ns;

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay (Figure3 and 4)	C _L = 15pF	3~3.6		7.4	10.9	1	13.4	ns
		C _L = 50pF	3~3.6		9.4	15.9	1	18.9	
		C _L = 15pF	4.5~5.5		5.9	7.9	1	9.4	
		C _L = 50pF	4.5~5.5		7	9.9	1	11.9	

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Operating Characteristics

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	$V_{CC} = 5.5V, V_I = 0V \text{ or } V_{CC}$	3	pF
C_{PD}	Power Dissipation Capacitance (5)	10MHz, $V_{CC} = 3.3V, V_I = 0V \text{ or } V_{CC}$	20	pF
		10MHz, $V_{CC} = 5.5V, V_I = 0V \text{ or } V_{CC}$	20	

Note5: C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz;

f_o = output frequency in MHz;

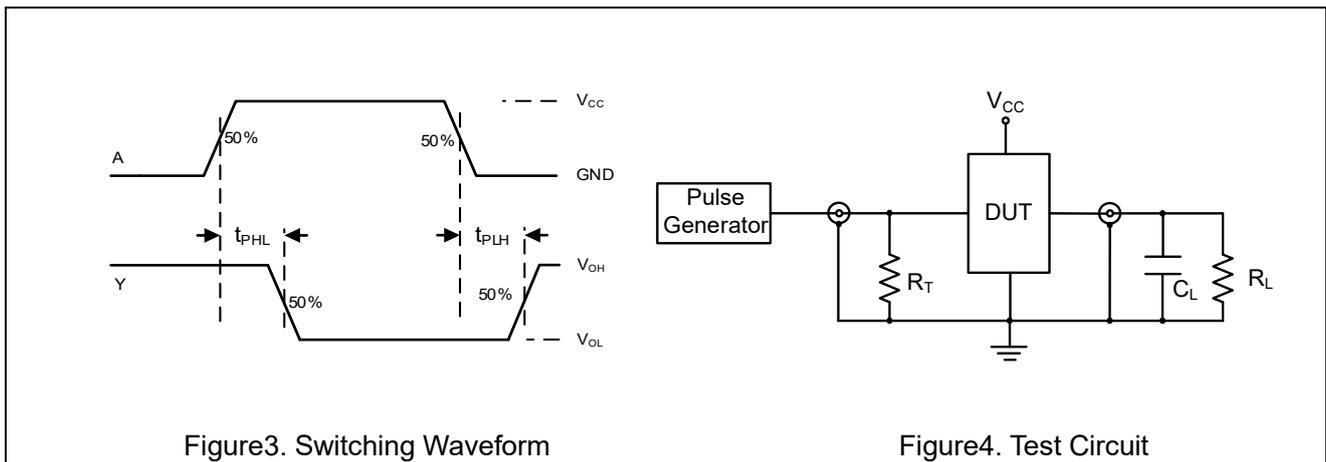
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

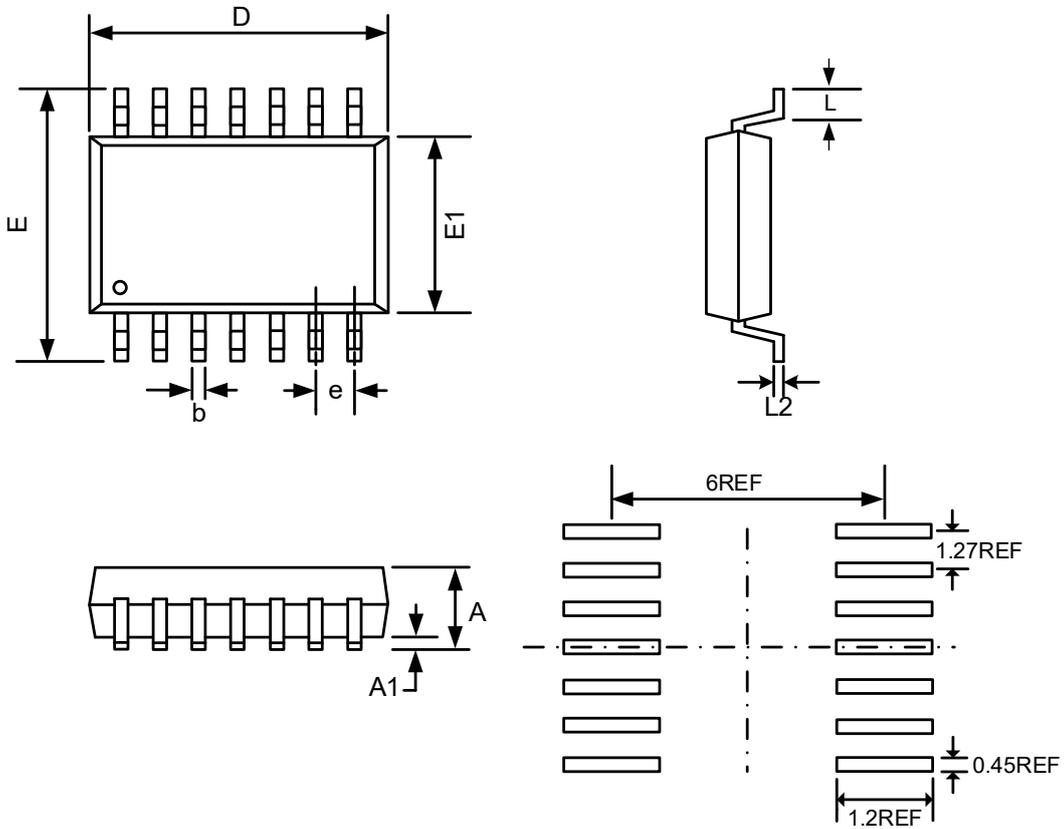
AC Test Circuit



ET74AHC04

Package Dimension

SOP14 (3.9mm × 8.65mm)



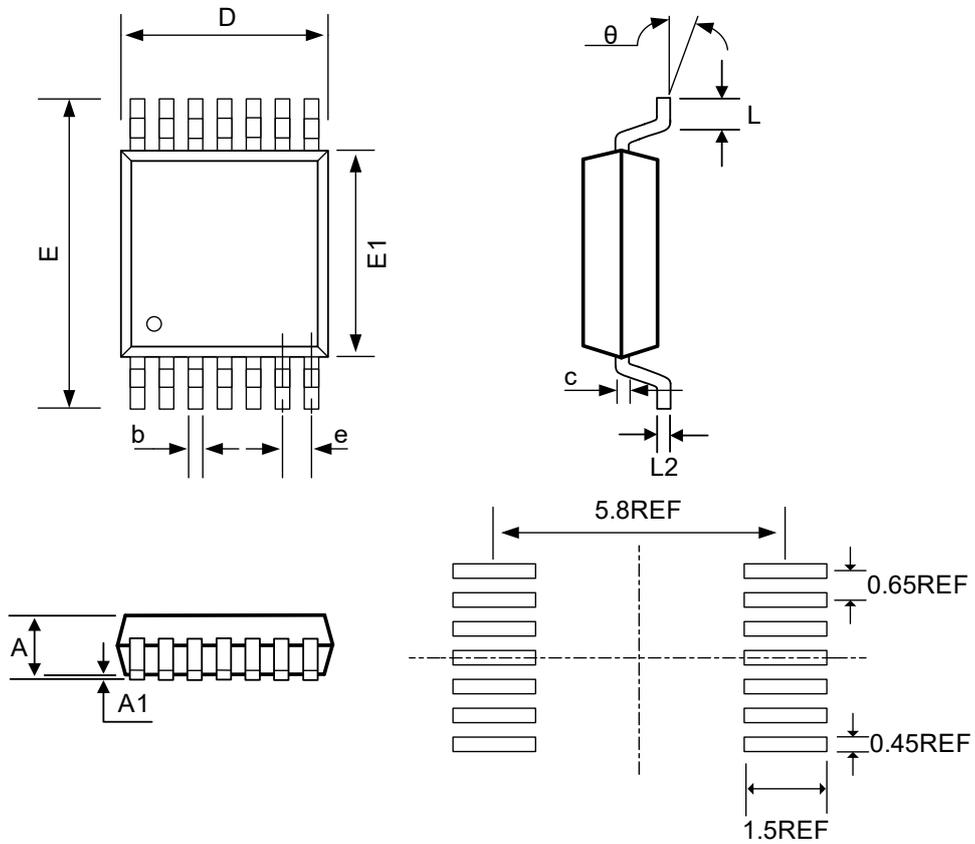
COMMON DIMENSIONS

(Unit: mm)

Symbol	Min	Max
A	--	1.75
A1	0.10	0.25
b	0.36	0.51
D	8.55	8.75
E	5.80	6.20
E1	3.80	4.00
e	1.22	1.32
L	0.45	0.75
L2	0.25 BSC	

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TSSOP14 (4.4mm × 5.0mm)



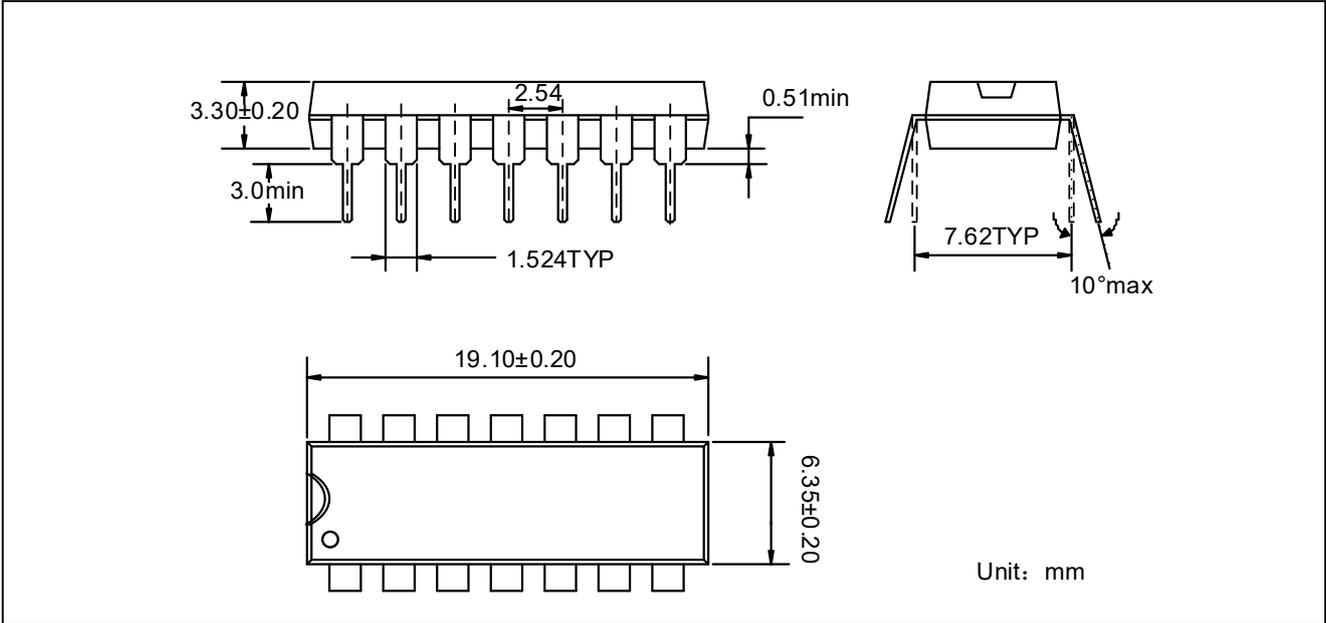
COMMON DIMENSIONS

(Unit: mm)

Symbol	Min	Max
A	--	1.20
A1	0.05	0.15
b	0.19	0.30
c	0.15 REF	
D	4.86	5.10
E	6.20	6.60
E1	4.30	4.50
e	0.65BSC	
L	0.45	0.75
L2	0.25 REF	
θ	0°	8°

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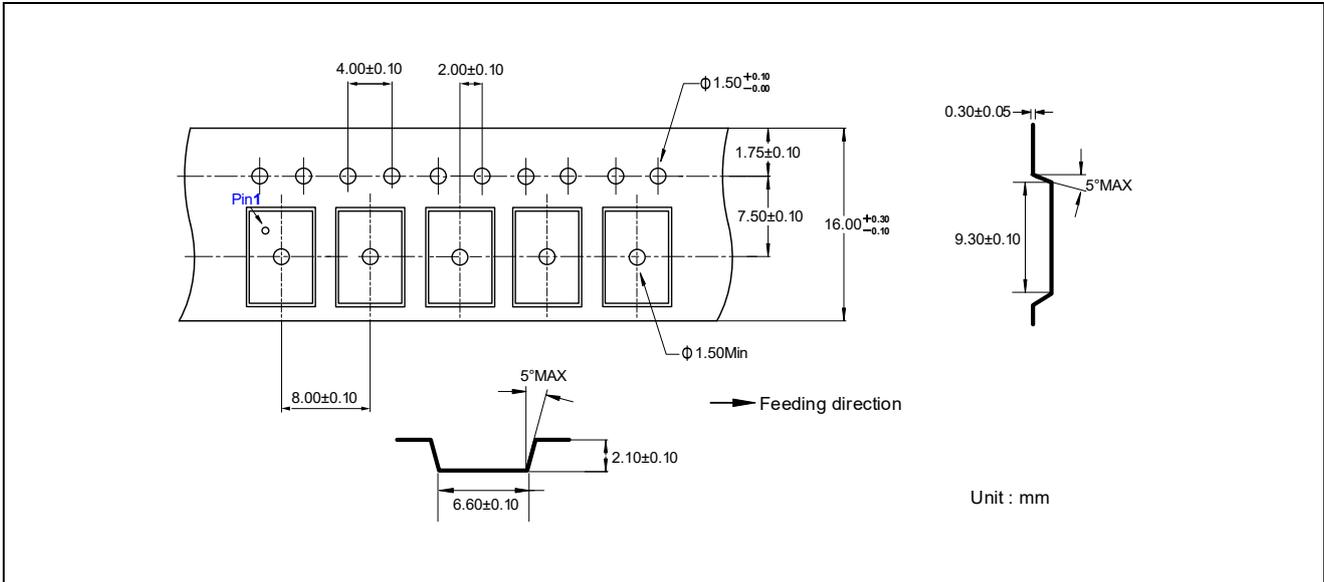
DIP14 (19.10mm × 6.35mm)



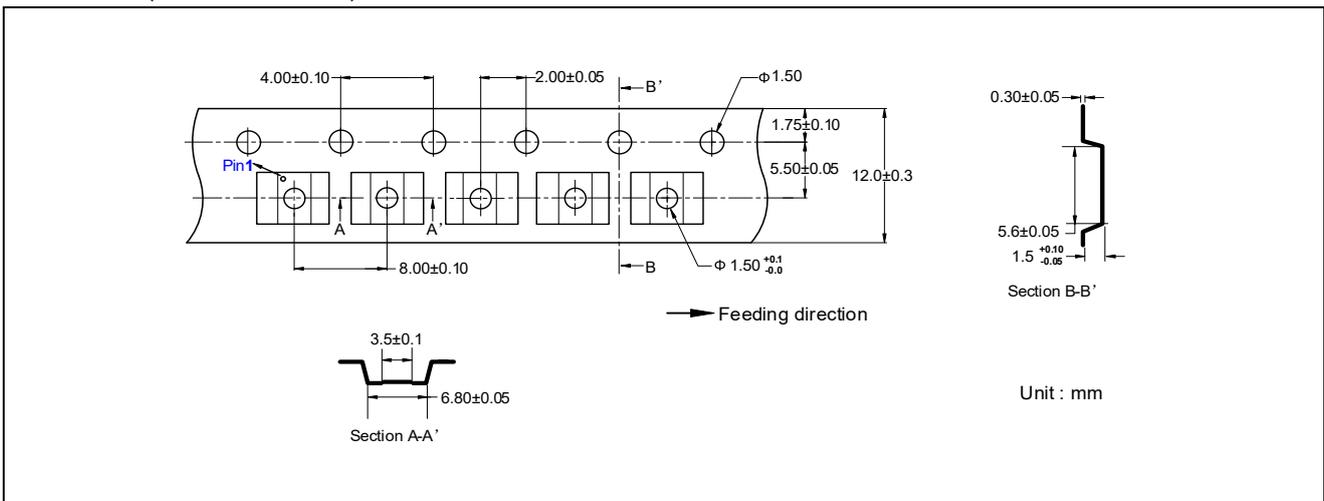
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Tape Information

SOP14 (3.9mm × 8.65mm)



TSSOP14 (4.4mm × 5.0mm)



Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-11-06	Official Version	Wang anran	Yang xiaoxu	Liu jiating